



Evaluation of antidiarrhoeal activity of ethanolic extracts of *Pithecellobium dulce* on castor oil-induced Diarrhoea in albino Wistar rats

Choday Venu[✉], Ramanjaneyulu K, Satish Reddy N, Vijaya laxmi B, Bhavana alla

Department of Pharmacology, Vishnu Institute of Pharmaceutical Education and Research, Telangana, India

[✉]Corresponding author: Vishnu Institute of Pharmaceutical Education and Research, Vishnupur, Narsapur, Medak, India; Email: rishi.choden05@gmail.com

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General Note



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ABSTRACT

The study was aimed to evaluate the antidiarrhoeal effect of ethanol extract of *Pithecellobium dulce* (Family: Leguminosae) using castor oil induced diarrhoea in rats. At the doses of 100, 200 and 400 mg/kg, the ethanolic extract showed significant antidiarrhoeal activity in both models. The extract, at the dose of 100, 200 and 400 mg/kg, retarded the intestinal transit of charcoal meal in mice as compared to the control. The ethanolic extracts show more effective against castor-oil induced diarrhea. From the results we conclude that *Pithecellobium dulce* had reported antidiarrhoeal activity in dose dependent manner.

Choday Venu et al.

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Keywords

Pithecellobium dulce, antidiarrhoeal activity, Loperamide, Castor oil

1. INTRODUCTION

Diarrhoea diseases are a major problem in Third World countries and are responsible for the death of millions of people every year [1]. Diarrhoea is an alteration in normal bowel movement and is characterized by an increase in the water content, volume, or frequency of stools [2]. Plants have long been a very important source of new drugs. Many plant species have been screened for substances with therapeutic activity. Medicinal plants are a promising source of antidiarrhoeal drugs [3]. For this reason, international organizations including the World Health Organization (WHO) have encouraged studies pertaining to the treatment and prevention of diarrhoeal diseases using traditional medical practices [4,5,6]. The present study was undertaken to find out the possible actions *Pithecellobium dulce* Benth on immune system in albino rats. *Pithecellobium dulce* Benth (Family: Leguminosae) is a small to medium-sized, ever green, spiny tree up to 18 m height, native of tropical America and cultivated throughout the plains of India and in the Andamans. It is known as 'vilayati babul' in Hindi and 'kodukkapuli' in Tamil [7]. The fruits have been shown to have anti-inflammatory activity [8]. Leaves have been reported to be a folk remedy for ear ache, leprosy, peptic ulcer, tooth ache, and venereal disease. It also acts as astringent, emollient, abortifacient, antidiabetic, anodyne and larvicidic in folk medicines. The bark of the plant is reported to be used as an astringent for dysentery, febrifuge and it is also useful in dermatitis and eye inflammation and also posses antivenomous activity [9].

2. MATERIALS AND METHODS

Plant material and Preparation of extract

The leaves of *Pithecellobium dulce* were collected in the month of august from Tirupati Department of Botany, authenticated by Madhav Shetty, Telangana (India). The plants were air dried in shade for 15 days and then the aerial parts of the plants taken for the study. Coarse powder of *Pithecellobium dulce* was extracted separately with ethanol using a soxhlet apparatus. The extracts thus obtained were dried under reduced pressure at a room temperature not exceeding 40°C to get the extracts.

Animal

Albino Wistar rats (weighing 150-200 g) of both sexes, were procured from NIN, Hyderabad, India and were housed in standard metal cages. They were provided with food, water & libitum and allowed a one week acclimatization period prior to the study. The protocol was approved by Institutional animal ethical committee of VIPER, Narsapur Medak and the study was performed according to the CPCSEA guidelines (1358/ac/10/CPCSEA).

Experimental Design

Healthy Wistar rats were distributed into 5 groups, each group consisting of 5 animals, which received the treatments in following manner

- Group I: Normal control [1% carboxymethylcellulose (CMC) 10 mL/kg, body weight]
- Group II: Standard drug (loperamide 3 mg/kg body weight)
- Group III: Ethanolic extract of *Pithecellobium dulce* (100 mg)
- Group IV: Ethanolic extract of *Pithecellobium dulce* (200 mg)
- Group V: Ethanolic extract of *Pithecellobium dulce* (400 mg)

All animals were initially screened for induction of diarrhoea by administering 2 mL of castor oil. Only animals which developed diarrhoea were selected for antidiarrhoeal studies.

Castor Oil- induced Diarrhoea in Rats

Wister rats were taken and weighed, 160 to 200 g were taken and kept fasting for 24 hours with access to water. The standard anti-diarrhoeal drug (loperamide, Yashica Pharmaceuticals Ltd., Thane, Maharashtra, India) and test sample (Ethanolic extract of *Pithecellobium dulce*, 100, 200, 400 mg/kg body weight) to be tested were administered orally by gavage. For castor oil-induced diarrhoea, 2mL of castor oil was administered orally to each animal by gavage after one hour after administration of drug/extract, 40 minutes after administration of drug/extract. All animals were placed in individual cages, where floor was lined with non-wetting paper. Non-wetting papers were changed every hour up to 5 hours. Characteristic diarrhoeal droppings of every hour up to the 5th hour were recorded after draining the urine by gravity. The stools were taken and calculated.

Statistical analysis

Data were analyzed by one-way ANOVA followed by Dennett's t-test. At 95% confidence interval $p < 0.05$ was considered statistically significant.

Choday Venu et al.

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3. RESULTS AND DISCUSSION

In castor oil-induced diarrhoea model, Ethanolic extract of *Pithecellobium dulce* showed antidiarrhoeal effect in Wistar rats. Loperamide, the standard antidiarrhoeal drug, was same in reducing the number of faeces by 70.94%, while *Pithecellobium dulce* extract was found to be most effective, reducing diarrhoeal droppings by 70.90%. *Pithecellobium dulce* extract significantly ($p<0.01$) reduced the wet faeces and total number of faeces, when compared to control group and we conclude that *Pithecellobium dulce* had reported antidiarrhoeal activity in dose dependent manner. (Table1).

Plant extract significantly ($p<0.01$) reduced the wet faeces and total number of faeces, when compared to control group using one way ANOVA followed by Dunnett's 't' test (Table 2). In the traditional medicine system, *Pithecellobium dulce* is used in the management of diarrhoea. The present study sought to assess the antidiarrhoeal activity of the plant. Our results showed that the extract inhibited significantly ($p < 0.01$) castor oil-induced diarrhoea in rats. Several mechanisms had been previously proposed to explain the diarrhoeal effect of castor oil. These constituents may be responsible for the antidiarrhoeal activity of the Extract of *Pithecellobium dulce*.

Table 1 Effect of Ethanolic extract of *Pithecellobium dulce* on castor oil-induced diarrhoea in Wistar rats

Treatment	Dose (mg/kg, p.o.)	Mean of wet faeces in 6 hours (n)	Mean of total number of faeces in 6 hours (n)	Faeces reduction (%)
Control	10	20.62±1.02	23.4±2.07	-----
EtOH extract	100	19.80 ± 0.73	12.20 ± 1.06*	36.40
EtOH extract	200	200	13.2±1.92**	47.77
EtOH extract	400	5.6 ±0.80*	6.8±0.80*	65.90
Loperamide	3	5.62±0.90*	6.8±0.84*	70.94

4. CONCLUSION

The results of this investigation revealed that *Pithecellobium dulce* contains pharmacologically active substances with antidiarrhoeal properties. These attributes may provide the rationale for the use of *Pithecellobium dulce* in diarrhoea management by traditional healers. Further research is needed to fractionate the Ethanolic extract and isolate the molecule(s) responsible for the antidiarrhoeal activity observed.

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